Part 8 · Number Search & Magic Square

Work out each answer below, then find it hidden in the digit grid — across, down, diagonally or backwards.

1. Distance in metres of the point from a 15√3 m tower (Example 1)
2. Common angle of elevation in degrees seen throughout the exercise
3. Angle of elevation, in degrees, that gives tan = 1
4. Angle of elevation, in degrees, that gives tan = √3
5. Height in metres of a broken tree top touching the ground at 30° (Q2 base)
6. Length in metres of the flying kite's ground-tied string scenario (2×20)
7. Length in metres of the circus artist's rope divided by 2
8. Height in metres of the lighthouse in the two-ships problem

7	3	0	8	5	5	9	5	8	9	3	3	0
2	5	1	5	9	6	1	8	8	4	1	3	5
3	7	1	6	0	9	5	5	4	3	8	4	5
8	9	0	1	7	4	9	6	4	8	3	9	1
3	6	7	4	9	8	2	7	4	0	2	8	1
1	4	8	9	8	7	6	5	0	5	0	9	4
9	8	7	5	0	9	3	3	5	6	6	2	2
7	3	2	1	2	9	5	8	0	3	6	1	4
7	0	1	6	5	7	1	5	0	4	0	2	2
8	7	3	7	8	7	9	9	0	1	2	2	8
5	0	9	3	0	6	1	0	1	0	4	0	8
4	3	9	8	2	8	9	4	4	9	9	1	9
7	5	8	0	1	6	2	0	6	5	4	9	7

☐ 15	☐ 30	☐ 45	☐ 60	☐ 20
☐ 40	☐ 10	☐ 75		

Magic Square — every row, column and diagonal adds to the same total.

	1	**6**
	5	

4		**2**

Magic constant: 15. Fill the empty cells.

Concept Bingo

Fill the empty grid below with any 16 terms from the bank — in any order, one per box. Then work down the clue list: each clue describes one term without naming it. Cross off a box only when you are sure which term its clue is describing. Get four crossed in a row, column or diagonal and you have bingo.

Term bank — choose any 16:

Line of sight	Angle of elevation	Angle of depression	Horizontal level
Right triangle	Opposite side	Adjacent side	Hypotenuse
tan ratio	sin ratio	cos ratio	Tower
Ladder	Shadow	Observer's eye height	Alternate angles
Kite string			

Your bingo card:

Clue list — read each clue and find the term it describes:

① The line drawn from the observer's eye to the point on the object viewed.
② The angle with the horizontal formed when looking up at an object.
③ The angle with the horizontal formed when looking down at an object.
④ The reference line from which elevation and depression are measured.
⑤ The shape formed by a vertical object, the horizontal ground, and the line of sight.
⑥ The side of a right triangle facing the angle in question, away from it.
⑦ The side of a right triangle that lies along one arm of the angle in question.
⑧ The longest side of a right triangle, opposite the right angle.
⑨ The ratio to use when you know the adjacent side and want the opposite side.
⑩ The ratio to use when you know the hypotenuse and want the opposite side.

- The ratio to use when you know the hypotenuse and want the adjacent side.
- A tall vertical structure whose height is often the unknown in these problems.
- An inclined object whose length is usually the hypotenuse of a right triangle.
- The dark patch cast on the ground, whose length changes with the Sun's altitude.
- The measurement that must sometimes be added back once a triangle is solved.
- The pair of equal angles formed when a transversal crosses two parallel horizontals.
- The line, usually treated as straight, along which a kite's height is measured.

Every skyline, kite string and ladder around you is secretly a right triangle waiting for its angle. You now know exactly which ratio to reach for. □□